segments of the space station. P3/P4 was added to the space station during STS-115 in September. The P5 will be part of the Integrated Truss Structure, which eventually will span 356 feet.

A small pressurized logistics module (SPACEHAB) will ride to the station inside the payload bay. The pressurized module—measuring 10 feet long, 14 feet wide and 11 feet high—will be filled with about 5,800 pounds of station supplies and research equipment, and an Integrated Cargo Carrier that holds spare parts and equipment.

SPACEWALKS

The STS-116 crew is slated to conduct three spacewalks. Curbeam will perform all three, teaming with Fuglesang during the first two and Williams for the third. All three spacewalks will be staged out of station's Quest airlock.

Curbeam and Fuglesang will conduct the first spacewalk on Flight Day 4 to assist with the installation of P5 to P4. They will finalize the installation with power, heater and data cable connections.

The mission's second spacewalk is set for Flight Day 6. Curbeam and Fuglesang once again will team to redirect part of the power channel by routing primary power through the Main Bus Switching Units, which have been stored outside the station since 2002.

On Flight Day 8, Curbeam and Williams will finalize the power reconfiguration.

UNDOCKING AND LANDING

Discovery is slated to undock on Flight Day 10. The STS-116 crew will conduct final inspections of the orbiter's heat shield, deploy three small technology-demonstration satellites and prepare for landing. The satellites will be mounted inside canisters in the payload bay.

Landing is scheduled to take place at KSC on Flight Day 13.

Above: ***The STS-116 mission will launch no earlier than Dec. 7 from the Kennedy Space Center.***

Left: ***Scheduled to launch aboard the Space Shuttle*** **Discovery** ***are, front row (from the left), astronauts William A. Oefelein, pilot; Joan E. Higginbotham, mission specialist; and Mark L. Polansky, commander. On the back row (from the left), are astronauts Robert L. Curbeam, Nicholas J.M. Patrick, Sunita L. Williams and the European Space Agency's Christer Fuglesang, all mission specialists. Williams will join Expedition 14 in progress to serve as a flight engineer and science officer aboard the International Space Station.***

Hubble re-servicing mission a 'go'

Space shuttle astronauts will make one final house call to NASA's Hubble Space Telescope as part of a mission to extend and improve the observatory's capabilities through 2013.

Hubble is the first major optical telescope to be placed in space, the ultimate mountaintop. Above the distortion of the atmosphere, far above rain clouds and light pollution, Hubble has an unobstructed view of the universe. Scientists have used Hubble to observe the most distant stars and galaxies as well as the planets in our solar system.

From far to near, from the earliest moments in the universe to current sandstorms on the surface of Mars, Hubble's launching in 1990 marks the most significant advance in astronomy since Galileo's telescope. Our view of the universe and our place within it has never been the same.

NASA Administrator Michael Griffin announced plans for a fifth servicing mission to Hubble Tuesday, Oct. 31, during a meeting with agency employees at NASA's Goddard Space Flight Center in Greenbelt, Md. Goddard is the agency center that is responsible for managing Hubble.

"We have conducted a detailed analysis of the performance and procedures necessary to carry out a successful Hubble repair mission over the course of the last three shuttle missions. What we have learned has convinced us that we are able to conduct a safe and effective servicing mission to Hubble," Griffin said. "While there is an inherent risk in all spaceflight activities, the desire to preserve a truly international asset like the Hubble Space Telescope makes doing this mission the right course of action."

This mission will provide unlimited possibilities to further our understanding of our mysterious universe.

"I know (there are) probably a lot of excited and happy astronomers and scientists, but also a lot of teachers and students that use Hubble as a training tool," Michael Good, mission specialist for the fifth Hubble servicing mission, said. "We're looking forward to making Hubble better to inspire and discover."

The flight is tentatively targeted for launch during the spring to fall of 2008. Mission planners are working to determine the best location and vehicle in the manifest to support the needs of Hubble while minimizing impact to International Space Station assembly. The planners are investigating the best way to support a launch mission for the Hubble flight. The present option will keep Launch Pad 39-B at the Kennedy Space Center available for such a rescue flight should it be necessary.

Griffin also announced the astronauts selected for the mission. Veteran astronaut Scott D. Altman will command the final space shuttle mission to Hubble. Navy Reserve Capt. Gregory C. Johnson will serve as pilot. Mission specialists include veteran spacewalkers John M. Grunsfeld and Michael J. Massimino and first-time space fliers Andrew J. Feustel, Michael T. Good and K. Megan McArthur.

"It really is a great day for discovery and exploration," Altman said. "This is a tremendous opportunity for science and the future. It's thrilling for all of us to be a part of the team to keep Hubble alive."

The two new instruments that will be installed on the Hubble are the Cosmic Origins Spectrograph (COS) and the Wide Field Camera 3 (WFC3). The COS is the most sensitive ultraviolet spectrograph ever flown on Hubble. It will probe the cosmic web, the large-scale structure of the universe whose form is determined by the gravity of dark matter and is traced by the spatial distribution of galaxies and intergalactic gas.

WFC3 is a new camera that is sensitive across a wide range of wavelengths (colors), including infrared, visible and ultraviolet light. It will have a broad spectrum from the planets in our solar system to the early and distant galaxies beyond Hubble's current reach and to nearby galaxies with stories to tell about their star formation histories.

Other planned work includes installing a refurbished Fine Guidance Sensor that will replace one degrading unit of the three units already onboard Hubble. The sensors control the telescope's pointing system. An attempt will also be made to repair the Space Telescope Imaging Spectrograph. Installed in 1997, this spectrograph stopped working in 2004. The instrument is used for high-resolution studies in visible and ultraviolet light of both nearby star systems and distant galaxies, providing information about the motions and chemical makeup of stars, planetary atmospheres and other galaxies.

"Hubble is a really special instrument that resonates with people worldwide, and I am happy to be part of this team," McArthur said.

This special telescope has been one of the most influential in answering questions about our elusive galactic home.

"Hubble has been rewriting astronomy textbooks for more than 15 years, and all of us are looking forward to the new chapters that will be added with future discoveries and insights about our universe," said NASA's Associate Administrator for the Science Mission Directorate Mary Cleave.

The Hubble servicing mission is an 11-day flight. Following launch, the shuttle will rendezvous with the telescope on the third day of the flight. Using the shuttle's mechanical arm, the telescope will be placed on a work platform in the cargo bay. Five separate spacewalks will be needed to accomplish all of the mission objectives.

Astronauts C. Michael Foale, left, and Claude Nicollier (on **Discovery***'s robotic arm) install a Fine Guidance Sensor into a protective enclosure in the shuttle's payload bay. Foale and Nicollier performed the second of three spacewalks to service the Hubble Space Telescope on the STS-103 mission. A large-format camera inside* **Discovery***'s cabin was used to record this image, while the shuttle was orbiting above ocean and clouds.*

"The Hubble mission will be an exciting mission for the shuttle team. The teams have used the experiences gained from Return to Flight and station assembly to craft a very workable Hubble servicing flight. The inspection and repair techniques, along with spacewalk planning from station assembly, were invaluable in showing this mission is feasible," said Associate Administrator for Space Operations Bill Gerstenmaier. "There are plenty of challenges ahead as the teams do the detailed planning and figure the best way to provide for a launch-on-need capability for the mission. There is no question that this highly motivated and dedicated flight control team will meet the challenge."

The Hubble is a challenge with tangible payoffs toward space exploration goals.

"The search for planets outside our solar system is a big question. Hubble is part of that," Grunsfeld said. "It marries science and human spaceflight. It makes discoveries on its own, but also in concert with Spitzer and Chandra (telescopes). So Hubble plays a key role in inspiring young people to go into science and technology, and they may go on to be the first crew to Mars."

The Hubble servicing mission crew is thrilled to be a part of this exciting new human spaceflight milestone.

"As I've been sitting here, I remember a night when I was 10 and realized a person was standing on the moon," Altman said. "I thought of how I could go out there. Now we're part of that and we're excited to make Hubble continue to be the success story it is now."

Home away from home for the holidays

by Kendra Phipps

**"…no matter how far away you roam,
If you want to be happy in a million ways,
For the holidays you can't beat home
sweet home!"**

**— "(There's No Place Like) Home for the Holidays"
by Robert Allen and Al Stillman**

Sometimes it just isn't possible to get home for the holidays.

Say, for instance, that you're an astronaut on the International Space Station and Christmas falls in the middle of your six-month mission. Thrilled as you are to be living and working in space, you'd probably wish you could fly home long enough to carve a turkey and open presents with your loved ones.

That situation has been a reality for many astronauts and cosmonauts, and the Operational Psychology Group does everything it can to ease the homesickness.

"Communication, keeping the families connected—that's our highest priority," said Operational Psychology Group Lead Gabrielle Avina with Wyle Labs.

The team, part of Johnson Space Center's Behavioral Health and Performance Space Medicine Group, strives to make space feel more like home for long-duration crew members. The tools in the team's belt include family videoconferences, online news updates and uplinks of the latest movies, just to name a few.

Every so often, in addition to the virtual visits and electronic entertainment, the Operational Psychology Group gets to send up more tangible reminders of home: crew care packages. These special deliveries, which arrive on space shuttles and Russian